DOCUMENT RESUME

ED 100 044 EA 006 665

AUTHOR	Alexander, Arthur J.
TITLE	Teachers, Salaries, and School District Expenditures. Report No. 1588-FF.
INSTITUTION	Rand Corp., Santa Monica, Calif.
SPONS AGENCY	Ford Foundation, New York, N.Y.
REPORT NO	R-1588-FF
PUB DATE	Oct 74
NOTE	42p.
AVAILABLE FROM	Rand Corporation, 1700 Main Street, Santa Monica, California 90406 ($3.00)
EDRS PRICE	MF-$0.75 HC-$1.85 PLUS POSTAGE
DESCRIPTORS	Contract Salaries; *Educational Finance; Educational Planning; Elementary Secondary Education; *Finance Reform; Multiple Regression Analysis; Salary Differentials; *School District Spending; Student Teacher Ratio; Teacher Education; Teacher Employment; *Teacher Salaries
IDENTIFIERS	California

ABSTRACT

This report investigates the relationship between total school district expenditures and expenditures on teachers in order to assess how increased budgets for public education might be spent. Specifically, it examines the budget share going to teachers as it is reflected in the ratio of teachers to pupils, the salary schedule, and the distribution of teachers by education and experience. The study uses census, financial, and school district information for 602 California school districts for the census year 1970 and the school year 1971-72. Through the use of regression equations for each school district, salary schedules were broken down into three structural elements: starting salary, annual increments for additional experience, and annual increment for educational credits beyond a B.A. degree. In 92 percent of the school districts, these three variables accounted for more than 98 percent of the variance in salaries in the schedules. The principal statistical results indicate that expenditures on teachers rise at a rate less than proportional to total expenditures, that salary schedules are relatively insensitive to total expenditures, that the distribution of teachers by experience and education appears to vary with total expenditures, and that teacher-pupil ratios are especially sensitive to total expenditures. (Author/DN)

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

ED 100044

TEACHERS, SALARIES, AND SCHOOL DISTRICT EXPENDITURES

PREPARED UNDER A GRANT FROM THE FORD FOUNDATION

ARTHUR J. ALEXANDER

R-1588-FF
OCT. 1974

Rand
SANTA MONICA, CA. 90406

EA 006 665

$3.00

The research described in this report was sponsored by The Ford Foundation under Grant 720-0161. Reports of The Rand Corporation do not necessarily reflect the opinions or policies of the sponsors of Rand research.

Published by The Rand Corporation

PREFACE

Most politically viable proposals for educational finance reform include increased budgets for public education. How will this money be spent? Since teachers absorb the major proportion of educational expenditures, a reasonable conjecture is that a large share of the increased budgets will be spent on teachers. Unfortunately, much of the public discussion of the equalization movement in educational finance ends at this level of analysis.[1] While not denying the reasonableness of the conjecture, it is not a very useful tool for predicting and evaluating the detailed effects of changes in expenditure levels. Analysis is advanced somewhat by noting the different uses to which increased expenditures can be put. The new money may, for example, go directly into teacher salaries, leaving the educational process basically unchanged. Or, it may be used to bring more or better teachers into the classroom. It is also possible that additional expenditures will not be used on teachers at all, but on improved facilities, more administration, or growth in noneducational services. The purpose of this report is to investigate the relationship between total school district expenditures and expenditures on teachers. Specifically, we examine the budget share going to teachers, the ratio of teachers to pupils, the salary structure, and the distribution of teachers by education and experience.

This research should help to illuminate some important problems of educational finance reform and provide guidance to those interested in the potential outcomes of the process.

This report has benefited from the thoughtful and rigorous criticism of James Hosek and John McCall, whose suggestions have been carefully considered though not always followed.

[1] Daniel Moynihan, for example, in an article on the growth of the public sector, makes the following points. "Who will benefit from this [equalization]? The question is easily answered: Teachers will benefit. Any increase in school expenditures will in the first instance accrue to teachers . . ." (p. 74).

SUMMARY

Most educational finance reform proposals call for increased budgets for public education. How this money will be spent is the subject of this report. Since teachers now absorb the major proportion of educational expenditures, the report analyzes the relationship between school district budgets and the three main components into which expenditures on teachers can be divided: numbers of teachers (teacher-pupil ratios); salary schedules; and teacher quality (experience and education).

Census, financial, and school district information and teacher salary schedules were available for 602 California school districts for the census year 1970 and the school year 1971-72. Statistical analyses examined the effect of total expenditures and of other variables on the share of the budget going to teachers and the three components of the teacher budget.

Through the use of regression equations for each school district, salary schedules were broken down into three structural elements: starting salary, annual increment for additional experience, and annual increment for educational credits beyond a B.A. degree. In 92 percent of the school districts, these three variables accounted for more than 98 percent of the variance in salaries in the schedules.

The principal statistical results follow:

- Expenditures on teachers rise at a less than proportional rate to total expenditures; that is, the budget share of teachers falls as total expenditures rise.
- Salary schedules, especially starting salaries, are relatively insensitive to total expenditures (elasticity of starting salary is only .1). The elements of the salary schedules are chiefly related to alternative wage rates in the community and the local cost of living.
- The distribution of teachers by experience and education appears to vary with total expenditures. High-spending districts have twice the proportion of teachers in the high-experience, high-education part of the salary schedules than do low-spending districts.
- Teacher-pupil ratios are especially sensitive to total expenditures, the elasticity being approximately .55.

Since salary schedules are primarily related to labor market conditions, and since the distribution of teachers by experience and education depends chiefly on mobility decisions of teachers, one of the few major areas in which school administrators can demonstrate some initiative is determining the number of teachers and the qualifications of new hires. However, as a case study analysis of Los Angeles school districts has shown, there is great diversity in just how school districts make detailed use of additional personnel.

The 12 highest spending and the 12 lowest spending unified school districts in the sample were examined. Of the total difference in expenditures on teachers ($662 per pupil *versus* $341 per pupil), teacher-pupil ratios accounted for two-thirds of the difference, teacher experience and education accounted for approximately one-quarter of the difference, and salary structures were responsible for the remainder, or about one-tenth of the difference.

Regression equations for the teacher budget components were used to predict the effect of changes in total expenditures. It was estimated that if school finance reforms increased the budgets of low-spending districts by 25 percent from $800 per

pupil to $1000, the long-run adjustment in budget allocations to teachers would rise by 20 percent, teacher-pupil ratios would increase by 13 percent (pupils to teachers falling from 25.2 to 22.3), starting salary would show only a 2-percent rise, and the salary of a teacher with eight years of experience and 30 credits beyond a B.A. would go up by less than 4 percent. From the marginal $200 increment in total expenditures, 41 percent would be spent on teachers and the largest part of that amount would be used to pay for more teachers.

CONTENTS

PREFACE iii

SUMMARY v

Section

I. INTRODUCTION 1
Focus of the Study 1
Method, Institutions, and Data 1

II. SCHOOL DISTRICT REVENUES AND TEACHER BUDGETS 4
Determinants of Total Expenditures 4
Expenditures on Teachers 5

III. ANALYTICS OF THE COMPONENTS OF TEACHER EXPENDITURES 9

IV. THE RATIO OF TEACHERS TO PUPILS 10

V. TEACHER SALARY SCHEDULES 13
Starting Salary 15
Experience and Education Increments, Highest Salary 17

VI. THE DISTRIBUTION OF TEACHERS BY EXPERIENCE AND EDUCATION 19

VII. INTEGRATION AND SUMMARY OF STATISTICAL RESULTS 22

VIII. INTERPRETATIONS AND CONCLUSIONS 27

BIBLIOGRAPHY 29

Appendix

A. MEANS AND STANDARD DEVIATIONS OF VARIABLES 31
B. CORRELATIONS BETWEEN VARIABLES 32
C. DEFINITION AND SOURCE OF VARIABLES 33

I. INTRODUCTION

FOCUS OF THE STUDY

This study focuses on the relationship between total school district expenditures and several components of expenditures on teachers. Major school finance changes of the past several years, as well as most proposals for school finance reform, call for substantial increases in aggregate school budgets, especially for poorer districts. Since the major proportion of school budgets is devoted to teacher salaries, analysis of the relationship between total expenditures and the components of the budget going to teachers should help in understanding and predicting the effect of changing financial patterns.

Budget allocation to teachers can be divided into three categories:

1. Numbers of teachers (teacher to pupil ratios).
2. Salary schedules.[1]
3. Teacher quality (experience and education).[2]

Much public discussion has centered on the question of the ability of teachers to capture the bulk of increased school budgets. One prediction often heard, for example, is that new money will go directly from the pockets of the taxpayer to those of the teachers with very little effect therefore on the educational process (e.g., Simon, p. 450). It is a goal of this research to determine the extent to which the three categories of teacher expenditures depend on the total budget of a district and on other economic, social, and demographic variables.

The data on which the research is based are for California school districts in the 1971-72 school year, supplemented by 1970 Census information and expenditures and receipts for two years, 1969-70 and 1971-72. The analysis is based on a cross-section of school districts at a given point in time. A fuller understanding of the dynamics of change would require data over an extended period that are not available within the confines of the present study. Nevertheless, many details of the long-run relationships affecting teacher expenditures can be illuminated by cross-section analysis.

Section II examines the determinants of total expenditures and the share going to teachers. The simple analytics of teacher expenditures are presented in Sec. III. Pupil-teacher ratios are investigated in Sec. IV. Section V presents a detailed analysis of salary structures, and the mix of teacher characteristics is examined in Sec. VI. The final sections integrate the findings and provide broader based interpretations and conclusions.

METHOD, INSTITUTIONS, AND DATA

The method relied on throughout much of this report departs to some extent from many studies of school finance. Models of school expenditures are often derived

[1] By "salary schedule" we mean the official wage scale, of the type that is often used in school districts and other civil-service employments, that specifies annual income as a function of years of teaching experience and educational degree credits. (See Table 4 for examples of the salary schedules of two school districts.)

[2] Throughout this report, other teacher qualities are ignored.

from choice-theoretic hypotheses based on household or school district utility functions and maximizing behavior. Such a theoretical structure is bypassed in the present study. The process whereby public education is provided is so far removed from standard economic assumptions of decisionmaking that to describe the process in highly detailed choice-theoretic terms requires a leap of faith that should strain one's credulity. There are many reasons for this assertion. First, there is no market where public education is bought by consumers. It is provided by elected bodies and highly bureaucratized organizations. Second, the tax rates by which local revenues are raised must often be voted upon by the electorate. Thus, there is a voting and administrative process that interposes itself between consumer and producer. Third, the technology by which education is produced is not well understood.[3] Fourth, the notion of what education is or ought to be is subject to considerable debate.

This is not to say that theory is abandoned. Theories are still useful for gross prediction: For example, the simple assumption that education is a normal good yields the implication that the richer a district, the more education it will buy. Other implications are derived from prior observations or from a priori reasoning: For example, "district expenditures are related primarily to district property wealth"; or, "teacher salaries are determined mainly by alternative wage rates." The hypotheses that are tested are simply not derived from first principles.[4] The major goal is to answer some questions about school district expenditures on teachers. Many of the conclusions derived from the study will therefore be post hoc explanations of what was discovered, rather than confirmations or refutations of prespecified hypotheses.

The analytical technique used throughout this study is cross-sectional and statistical. We do not observe school districts over time and hence cannot estimate their detailed response to changes. We rely on the assumption that if poor districts become richer, they will eventually settle into behavior patterns currently evinced by similarly situated richer districts. We performed no case studies, developed no questionnaires, and made no systematically structured interviews. The results of this study should therefore be highly complementary to a detailed, case study approach.[5]

The data on which this study is based are for California school districts.[6] Census information on population, housing, income, and socioeconomic characteristics is available for 1970. School district receipts, expenditures, and attendance figures were obtained for the 1969-70 and 1971-72 school years from official state sources. Detailed teacher salary schedules and the placement of teachers in those schedules were available for 1971-72. The salary schedules were also the source of both numbers of teachers and total salaries paid to teachers, thus assuring algebraic consistency between these variables.[7] The figures for expenditures on teachers derived in this manner differ from the official budget figures reported to the state education

[3] For example, a theoretical difficulty arises because the process by which education is produced is valued together with the output of the process. For example, *how* one learns to read may be as important as *how well* one learns to read.

[4] I am, of course, aware of the many models of voter behavior, public goods, and organizational processes. However, I do not think that they possess either sufficient explanatory power or specificity for use in policy analytic research of the present type.

[5] An investigation based on the case study method has been conducted by Kirst. This study on Los Angeles County school districts complements the present work in many details, and the conclusions of the two studies are remarkably similar.

[6] See App. C for definition and source of variables.

[7] Bonuses paid to teachers holding advanced degrees were ignored if the bonuses were not part of the regular salary schedule. Such bonuses, if paid, are generally quite small, amounting to a few hundred dollars per year at the most.

authorities, although both sets of figures are highly correlated with each other.[8] There is thus a comprehensive data base on more than 600 California school districts for the 1969-72 period. The data base is biased in that the very smallest districts are not included. Neither the 1970 Census nor the official California reporting system collects or publishes information on school districts of less than 200 to 300 pupils. The data base covers roughly 60 percent of all school districts (83 percent of all districts with more than 300 pupils) and about 97 percent of all pupils. Because the data were collected from several different sources with somewhat different coverage by each source, the number of observations will show minor variations in the statistical results reported below.

One institutional detail is worth noting at this point. California school districts can be one of three main types: elementary, high school, or unified. Unified districts include both elementary and high school pupils, whereas the others are restricted to pupils of the specified level. Several small elementary districts are often found within the boundaries of a larger high school district. This means, for example, that the usual measures of district wealth—property value per pupil—will be larger for both elementary and high school districts than for unified districts, and tax rates will therefore be lower.[9] Teaching patterns may also differ in elementary schools and high schools, and these differences would be reflected by the type of district. For analytical purposes, it is often necessary to account for these institutional characteristics.

[8] The simple correlation between the official budget category for expenditures on teachers and figures derived from the salary schedules is .985.

[9] This is because the total property base is divided by fewer students in the elementary and high school districts than in the unified districts. Total taxes paid by an individual household, however, will be similar in all districts, because those in nonunified districts must pay two taxes—to the elementary and to the high school district.

II. SCHOOL DISTRICT REVENUES AND TEACHER BUDGETS

DETERMINANTS OF TOTAL EXPENDITURES

The main aim of this study is to examine the degree to which total district expenditures for education are associated with the level and structure of teacher budget allocations. The implied assumption in this approach is that the budget total is exogenously determined and is, to a large extent, beyond the control of local school authorities. An alternative assumption is that causality runs in the other direction; that is, total budgets are better explained as the sum of individually determined budget subcomponents. A third possibility, of course, is that the system is simultaneously determined.

The first assumption—that allocations are made subject to an overall budgetary constraint—is the one adhered to in this study. This simplifying assumption is largely based on statistical and institutional arguments. The statistical evidence lies in the fact that most of the variance in locally raised revenues per pupil—the revenue category most under local control—is explained by variables that are independent of school district decisions—assessed property value and number of students. For a sample of unified districts, an equation (in the logarithm of these variables) has an R^2 of almost .80 (Eq. 1, Table 1); the R^2 for an equation based on the full sample of districts is .83 (Eq. 8, Table 1). Tax rate was also used as a dependent variable with quite similar results, the proportion of variance explained by the equation—76 percent—being only slightly less than for locally raised revenues (Eq. 9, Table 1).

To test whether personal income or other community socioeconomic characteristics influenced the amount of revenues that were raised from local sources, sets of variables describing income, occupation, education, demography, urbanization, and property were added to the basic equation (Eqs. 2 through 7, Table 1). The most significant of these added variables was average family income with an elasticity of about .25 (Eq. 2, Table 1).[1]

In all the equations, the coefficients on assessed value and on the number of pupils are nearly equal and of opposite signs, indicating that a simple ratio of these two variables can be substituted for the two separate variables. Converting the logarithmic equations to exponential form, a relationship of the following type is observed:

$$L/ADA = k(AV/ADA)^s,$$

where L/ADA is locally raised revenue per pupil (ADA = average daily attendance), k is a constant, and AV/ADA is assessed property value per pupil. Thus, local revenues increase at a somewhat less than proportional rate with assessed value per pupil.[2]

[1] When the variables in an equation are in logarithms, the estimated coefficients can be interpreted as elasticities. That is, the coefficient describes the percentage increase in the dependent variable (locally raised revenues per pupil) for a 1-percent increase in the independent variable.

[2] Note that the effective tax rate (t) is the ratio of locally raised revenues to assessed property value:

$$t = L/AV = (L/ADA)/(AV/ADA).$$

Thus, if both sides of the equation for locally raised revenues per pupils are divided by assessed value

To test whether the price of teachers influences local revenues, the starting salary of teachers was added to Eq. 2. The coefficient on this variable was not significantly different from zero, and the point estimate of the elasticity was .35. (This equation is not shown.) Since the standard deviation of starting salary is only 7 percent of the mean, variations in this price term could be expected to have a negligible effect on revenues.

According to some models of residential choice, the direction of causality may run in the reverse direction from that specified above—from educational expenditures to residential property value. These models assume that families choose to live in those districts that provide a desired mix of public services. High expenditures on education could therefore enhance the value of residential property for a significant number of families who are usually hypothesized to be of higher socioeconomic status. Although this relationship is theoretically possible, it is probably not very strong. Even if school expenditures had a marginal effect on the value of residential property, owner-occupied residential property is less than a third of all property (see App. A). And, as shown above, the socioeconomic variables have at best a very weak effect on locally raised revenues (Table 1). Furthermore, the socioeconomic variables are not correlated at all with total property value per pupil (see App. B).

The assumption of exogenously determined school budgets is appropriate to an analysis of school finance reform. Most reform proposals will cause shifts in school district budgets that are beyond the control of local authorities. In particular, poor school districts will have more to spend on education regardless of the general determinants of the budgeting process. Even without reform, locally raised revenues represent only half of total school district revenues. The other half, from state and federal sources, is generally not under local control. Therefore, the residual variability in total expenditures that may be caused by such factors as teacher salary structure and differences in mobility patterns is quite small.

The conclusion that I draw from this evidence is that locally raised revenues depend primarily on the local property base, and that these revenues together with money received exogenously from other sources serve as an effective budget constraint on the detailed allocation of funds. Of course, in isolated cases, one may observe school authorities negotiating a pay settlement with teacher representatives and then going to the voters for approval of a tax increase to pay for the settlement. But the evidence of the above analysis suggests that this kind of behavior either is not very prevalent, or is not powerful enough to influence the results described by the equations.

EXPENDITURES ON TEACHERS

Expenditures on teachers absorb the major proportion of total school district budgets—from 45 percent to 65 percent in California. The questions examined below are whether teacher budgets vary in a systematic manner with total budgets, and whether other variables—such as community socioeconomic characteristics—affect the share of the budget devoted to teachers.

---

per pupil, the result will be the tax rate, or

$$t = k(AV/ADA)^{-1}.$$

Equation 9 of Table 1 shows that the statistical estimate is quite close to the algebraic result. (The statistical and algebraic results are not exactly the same, because the tax rate used in the statistical estimate is different from the effective tax rate defined above due to homeowner's and veteran's exemptions and other subventions.)

Table 1

EQUATIONS FOR LOCALLY RAISED REVENUES PER PUPIL (Eqs. 1 to 8) AND TAX RATE (Eq. 9)

Variable	Equation Number								
	1	2	3	4	5	6	7	8	9
R^2	.786	.800	.814	.800	.801	.804	.806	.827	.761
Standard error	.224	.217	.212	.218	.218	.216	.215	.322	.193
Number of observations	228	228	228	228	228	228	228	603	603
Constant	.555	-1.60	-.495	.969	2.16	.750	.480	-2.98	-1.84
Assessed property value[a]	.8	.801	.830	.810	.825	.839	.862	.896	-.152
	(27)	(26)	(28)	(26)	(25)	(28)	(23)	(33)	(10)
Pupils[a]	-.741	-.729	-.750	-.730	-.750	-.770	-.790	-.793	.210
	(28)	(29)	(27)	(28)	(26)	(26)	(25)	(3)	(17)
Average family income[a]		.254						.171	.318
		(3.9)						(5.7)	(8.6)
Occupation, professional			2.20						
			(5.3)						
Occupation, managerial			1.22						
			(2.0)						
Occupation, crafts			.77						
			(1.5)						
Occupation, sales and clerks			1.97						
			(3.5)						
Occupation, blue collar			1.23						
			(2.9)						
Occupation, farmers			1.00						
			(2.0)						
Education, high school				-.498					
				(2.0)					
Education, college				.067					
				(.3)					
Families with children					-1.54				
					(3.1)				
Elderly					-3.02				
					(3.8)				
Suburbs						.143			
						(2.9)			
Rural						-.049			
						(.70)			
Urban						-.038			
						(.46)			
Owner occupied							.368		
							(2.8)		
Residential/total property							.074		
							(.55)		
Average house value							.077		
							(1.4)		
Elementary								-.813	-.399
								(25)	(22)
High school								-.527	-.514
								(10.6)	(20)

NOTE: The variables are defined in App. C; the t statistic is in parentheses.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

The principal finding is that the proportion of the total budget devoted to teachers falls slowly with increasing budgets.[3] (See Table 2 for equations on teacher budget shares.) The simplified relationship has roughly the following form:

$$B_t/B = k(B/ADA)^{-.2},$$

where B_t is expenditures on teachers, B is total budget, ADA is average daily attendance, and k is a constant. Teacher expenditures per pupil therefore rise at a somewhat less than proportional rate with total expenditures:

$$B_t/ADA = k(B/ADA)^{.8}.$$

That is, higher spending school districts spend more on teachers, but not proportionately more than lower spending districts. Average family income has a positive (but not powerful) effect on teacher expenditures. If family income increased by 10 percent, the budget share going to teachers would rise by only 1 percent (rising, for example, from 50 percent to 50.5 percent). The reasons for this effect are unclear. Higher income families might prefer to devote a greater proportion of school budgets to teachers instead of, say, facilities. However, other socioeconomic variables exhibit mixed effects. Occupation has no effect, while college education has a positive effect on teacher expenditures.[4] (See Eqs. 3 and 4, Table 2.) Other reasons, which are investigated in more detail in later sections, are (1) that average family income is correlated with the overall level of wage rates in the community (which influence the level of teacher salaries); or (2) that teachers prefer to stay in higher income communities, accumulating seniority and education, and consequently higher salaries. In either case, the higher salaries could increase the budget share going to teachers.

The negative effect of the percentage of blacks in the community is more puzzling. One would expect that salaries would tend to be lower and teacher mobility out of the school district greater, thus leading to a lower proportion of expenditures on teachers. However, both starting salaries for teachers and average salaries are uncorrelated with percent black, and inclusion of starting salary and average salary in the equation does not reduce the value of the coefficient of percent black. These teacher salary variables, however, completely wipe out the effect of average family income. (See Eq. 5, Table 2.)

I would conclude from this evidence that (1) average family income is primarily a proxy for both community wage levels and attractiveness of the school district, and (2) that the reduced proportions of budgets going to teachers in communities with large percentages of black families are not explained by either wage levels or attractiveness of the school district, but (necessarily) by larger expenditures on other budget elements.

[3] The teacher budget as a proportion of total budget is used as the dependent variable here to avoid the econometric problems inherent in regressing a dependent variable on another variable that is composed, in large part, of the dependent variable. That is, since expenditures on teachers are approximately 50 percent of total expenditures, regressing one on the other would be like regressing the dependent variable against itself.

[4] Professional and managerial occupations, college education, and income exhibit simple correlations between themselves ranging from .62 to .89. See App. B for correlation coefficients.

Table 2

RATIO OF EXPENDITURES ON TEACHERS TO TOTAL CURRENT EXPENDITURES, SELECTED EQUATIONS

Variable	Equation Number				
	1	2	3	4	5
R^2	.113	.165	.161	.163	.198
Standard error	.151	.147	.148	.147	.144
Number of observations	595	595	595	595	595
Constant	-.208	-1.18	-.316	-.324	-1.77
Total expenditures per pupil[a]	-.218	-.180	-.166	-.176	-.248
	(8.7)	(5.6)	(5.1)	(5.5)	(7.2)
Elementary		.033	.034	.032	.044
		(2.3)	(2.3)	(2.2)	(3.1)
High school		-.019	-.027	-.022	-.026
		(.91)	(1.3)	(1.0)	(.3)
Black		-.319	-.406	-.367	-.340
		(2.9)	(3.3)	(3.4)	(3.1)
Average family income[a]		.095			.0015
		(3.6)			(.02)
Occupation, professional			.110		
			(.55)		
Occupation, managerial			.152		
			(.48)		
Occupation, crafts			.036		
			(.18)		
Occupation, sales and clerks			-.375		
			(1.4)		
Occupation, blue collar			.065		
			(.31)		
Occupation, farmers			-.045		
			(.21)		
Education, high school				-.029	
				(.32)	
Education, college				.155	
				(2.3)	
Average teacher salary[a]					.344
					(4.9)

NOTE: The variables are defined in App. C; the t statistic is in parentheses.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

III. ANALYTICS OF THE COMPONENTS OF TEACHER EXPENDITURES

Before proceeding with the statistical relationships, it wi l be helpful at this point to clarify the algebra of teacher expenditures. The school budget devoted to teacher salaries (B_t) is equal to the number of teachers (T) times the average salary level (Y):

$$B_t = TY.$$

Average salary, however, hides some important facts—the details of the salary schedule and the proportion of teachers at each step in the schedule. If the i^{th} position in the salary schedule has a specified salary level of Y_i, and the number of teachers at that position (who receive salary Y_i) is T_i, then,

$$B_t = \Sigma T_i Y_i.$$

Teacher budget per pupil (b_t) and teachers per pupil (t) are obtained by dividing by the number of pupils (ADA):

$$b_t = B_t/ADA = (\Sigma T_i Y_i)/ADA \quad \text{and} \quad t = T/ADA.$$

Multiplying and dividing the above equation for b_t by T yields

$$b_t = t\Sigma(T_i/T)Y_i.$$

This last equation is most useful because it decomposes the teacher budget per pupil into the teacher-pupil ratio (t), the proportion of teachers in each position of the salary schedule (T_i/T), and the salary levels for each position (Y_i). An implication of this equation is that an increase in the teacher budget can go to *any* of these three components, but the three components are constrained by the total. Algebra alone though cannot tell us how the budget will be allocated. For answers to that question it is necessary to take a more detailed look at the data. The following statistical sections attempt to do that job.

IV. THE RATIO OF TEACHERS TO PUPILS

The ratio of teachers to pupils (as will be shown below) is the component of total teacher expenditures that is most sensitive to changes in total educational expenditures. The teacher-pupil ratio can be considered as a partial measure of the available educational services. A major defect of this measure is that it makes no distinction between teachers. This problem, however, is central to any evaluation of educational outcomes, and it will not be solved in this report. Moreover, there are other difficulties with this variable that are conceptually amenable to treatment, but again, they are ignored here. For example, increased numbers of teachers can be used to reduce average class size, increase the number of course offerings, reduce teaching loads, allow team teaching, or permit more time for class preparation. The available data do not contain the information necessary to make these finer distinctions. The data confine the analysis to rather gross details of the educational process. A case study technique would be required to delve into the details of budget allocations and the relationships between total expenditures and the finer features of resource use in schools.

Several equations were estimated to determine the variables related to the ratio of teachers to pupils. The variable most highly correlated with teachers per pupil is the level of total expenditures per pupil. Binary (0,1) dummy variables defined for elementary and high school districts indicate that elementary districts have a slightly higher teacher-pupil ratio, and high school districts have a barely perceptible lower ratio than do unified districts (the omitted dummy variable in the equation). (See Eq. 1, Table 3.)

To test the effect of socioeconomic and other community characteristics on the dependent variable, sets of variables measuring these characteristics were added to the basic equation. (These are shown as Eqs. 2 through 8, Table 3.) Income and education variables, while statistically significant, act in a negative direction—increased values of both variables reduce the number of teachers per pupil, holding total expenditures per pupil constant.[1] The negative effects of income and education could reflect community preferences for fewer teachers, or could be a response to the possibly higher cost of teachers. Teacher salaries are related to average family income (and thus to education and managerial and professional occupations) for several reasons. General wage rates in the community tend to be higher and teachers tend to remain in the school districts for longer periods, accumulating more experience, higher education, and therefore higher salaries.[2] For a given level of total expenditures, high socioeconomic status communities are therefore required to allocate more money to salaries and less to numbers of teachers. Equation 6 of Table 3 supports this argument. Starting teacher salary (assumed here, and shown later, to be exogenous) is included in the equation instead of average family income. This variable is more significant, has a more negative coefficient, and the equation explains more of the total variance (higher R^2) than does the equation with family income. When both variables are included together (Eq. 7, Table 3), starting salary retains its significance and size, whereas the coefficient of average family income falls to half its previous size, but remains statistically significant.

[1] Note also that professional occupation has a negative effect and that managerial occupation is insignificantly positive, conforming to the finding above for education and income.

[2] These points are described in more detail in later sections.

Table 3

EQUATIONS FOR RATIO OF TEACHERS TO PUPILS

Variable	Equation Number								
	1	2	3	4	5	6	7	8	9
R^2	.371	.404	.485	.409	.465	.447	.452	.522	.531
Standard error	.160	.156	.145	.155	.148	.150	.149	.139	.138
Number of observations	595	595	595	595	595	595	595	595	595
Constant	-4.41	-3.06	-4.07	-4.13	-4.44	2.93	2.65	-3.78	-.957
Elementary	.062	.063	.057	.057	.048	.058	.059	-.027	-.016
	(4.0)	(4.1)	(4.0)	(3.8)	(3.3)	(4.0)	(4.0)	(1.8)	(1.0)
High school	-.008	-.031	-.031	-.030	-.036	-.026	-.034	-.050	-.051
	(.36)	(1.4)	(1.5)	(1.4)	(1.7)	(1.2)	(1.6)	(2.6)	(2.7)
Total expenditures per pupil[a]	.552	.600	.580	.580	.573	.658	.666	.513	.560
	(16.6)	(17.9)	(18.6)	(17.3)	(18.2)	(19.6)	(19.9)	(17.5)	(17.3)
Average family income[a]		-.156					-.070		
		(5.7)					(2.4)		
Teacher starting salary[a]						-.853	-.750		-.338
						(9.0)	(7.2)		(3.3)
Pupils[a]								-.063	-.054
								(13.6)	(10.3)
Occupation, professional			-.391						
			(2.1)						
Occupation, managerial			.134						
			(.46)						
Occupation, sales and clerks			-.968						
			(4.8)						
Occupation, crafts			-.607						
			(2.4)						
Occupation, blue collar			-.187						
			(.94)						
Occupation, farmers			.467						
			(2.3)						
Education, high school				-.368					
				(3.8)					
Education, college				-.425					
				(6.1)					
Rural					.078				
					(3.5)				
Urban					-.119				
					(3.8)				
Suburbs					-.070				
					(3.3)				

NOTE: The variables are defined in App. C; the t statistic is in parentheses.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

The size of the school district has a small but significant negative effect on the teacher-pupil ratio—the elasticity being −.06. This effect is independent of either the urbanization of the community or the growth in number of pupils, since when these variables are all entered into an equation simultaneously, each one retains the same significance and coefficient value as when they are entered separately.[3]

The conclusion to be drawn from these statistical results is that the teacher-pupil ratio is primarily dependent on total expenditures per pupil, and significantly (in a statistical sense) but not powerfully related to teacher salaries, district size, and a few other variables of minor consequence. The elasticity of teachers to pupils with

[3] Note also that district size does not serve as a proxy for type of district, since variables for elementary or high school districts are also in the equation.

respect to total expenditures varies from .51 to .60. Converting the logarithmic equations to exponential form yields an equation of the following type:

$$T/ADA = k(B/ADA)^{.55}.$$

Doubling expenditures per pupil—for example, from $800 to $1600—would increase the teacher-pupil ratio by a little less than 50 percent—from .0384 to .0563 (according to Eq. 1, Table 3). This is equivalent to a reduction in the pupil to teacher ratio from 26 to 17.8. As will be seen, this effect is the most responsive element of total teacher expenditures to budget changes.

V. TEACHER SALARY SCHEDULES

Most analyses of teacher salaries ignore the fact that civil-service-type schedules are commonly used to calculate a teacher's salary on the basis of previous experience and educational credits. In many studies, the salary structure is collapsed into a single variable—most commonly, average salary. As was pointed out in Sec. III, such a figure hides many important characteristics, such as the structure of the salary schedule and the placement of teachers within the schedule. It was the aim of the present research, however, to separate the various components making up the total value of direct expenditures on teachers, an important part of which is the structure of salary schedules.

Salary schedules are basically lists that specify the salary for a given number of years of teaching experience and credits earned from accredited institutions of higher education.[1] The number of elements in the schedules examined in this study varied from approximately 40 to more than 160. Much of the information in these schedules, however, is redundant. Often, simple rules are used to establish the schedule; most of the information carried in the schedule can therefore be described by such a rule. For example, the following rule would be typical: The starting salary for a teacher with no experience and a B.A. degree is $7000; salary is increased by $350 for each year of experience and $30 for each credit beyond the B.A., until a maximum salary of $14,000 is reached. This rule could be completely described by only four structural characteristics: starting salary, increments for experience, increments for credits, and maximum salary. (The 1971-72 salary schedules for the Beverly Hills and Baldwin Park Unified Districts are shown in Table 4.) The technique used to condense the schedules was to estimate an equation for each school district with each element of the schedule as an observation. The dependent variable was the salary level, and the independent variables were the experience level and educational credits associated with that salary:

$$Y = a + bE + cC,$$

where Y is salary, E is experience, C is credits, and a, b, and c are coefficients to be determined by the regression equations. In some cases, an additional term, E^2, was added (if statistically significant) to allow for nonlinearity in the effect of experience. Other functional forms, including logarithmic, were tried, but the best results were obtained with the simple linear (sometimes quadratic) function. An indication of the degree to which this simple formulation fits the data is the fact that 92 percent of the R^2s were greater than .98, and the lowest R^2 was .93. Approximately half of the school district salary structures were described by equations accounting for more than .999 percent of the variance in the dependent variable.[2]

In addition to estimating equations for each school district, the starting salary and maximum salary were also obtained. The analysis of the structure of the salary schedule concentrates on starting salary and the salary increments for experience and education.

[1] Salary schedules of this type were available for 602 California school districts. Only a very few school districts had salary structures that were substantially different from the typical pattern discussed here.

[2] The equations for Beverly Hills and Baldwin Park are

Beverly Hills: $Y = 7090 + 642E + 53.2C, \quad R^2 = .997;$

Baldwin Park: $Y = 6524 + 340.4E + 2.44E^2 + 31C, \quad R^2 = .996.$

Table 4

SALARY SCHEDULES FOR BEVERLY HILLS AND BALDWIN PARK (1971-72)

BEVERLY HILLS

Years of Experience	Educational Credits					
	B.A.	B.A.+18	B.A.+36	B.A.+54	B.A.+69	B.A.+84
1	8009-0	8810-6	9690-2	10571-2	11512-0	12332-0
2	8488-0	9289-2	10170-5	11052-1	11933-0	12814-0
3	9050-2	9849-1	10732-9	11612-5	12493-0	13375-0
4	9690-0	10491-4	11372-11	12253-1	13133-2	14014-1
5	10331-0	11132-1	12012-7	12893-0	13774-4	14655-3
6	10971-0	11772-4	12653-3	13533-12	14415-3	15296-2
7	11693-2	12493-2	13375-2	14254-3	15135-1	16017-3
8	12413-0	13213-2	14095-5	14975-5	15855-4	16738-3
9	13133-4	13934-3	14814-4	15696-3	16577-2	17459-4
10	13854-2	14653-7	15535-15	16416-39	17297-22	18178-70
Merit plan				16916-6	17797-5	18678-27
Merit plan						19178-10

Total number of teachers: 349

BALDWIN PARK

Years of Experience	Educational Credits				
	B.A.	B.A.+20	B.A.+35	B.A.+55	B.A.+70
1	7104-4	7584-11	7944-8	8424-1	8784-0
2	7416-4	7920-8	8304-10	8808-0	9198-1
3	7728-6	8256-7	8664-22	9192-1	9612-0
4	8040-6	8592-11	9024-18	9576-0	10026-0
5	8352-8	8928-9	9384-10	9960-0	10440-1
6	8664-6	9264-7	9744-18	10344-1	10854-3
7	8976-8	9600-7	10104-14	10728-1	11268-2
8	9288-5	9936-7	10464-14	11112-3	11682-1
9	9600-7	10272-18	10824-18	11496-2	12096-1
10			11184-3	11880-0	12510-2
11			11544-14	12264-1	12924-1
12			11904-8	12648-1	13338-4
13			12264-7	13032-3	13752-1
14			12624-77	13416-8	14166-24

Total number of teachers: 440

NOTE: Numbers to right of salary indicate number of teachers receiving that salary.

STARTING SALARY

Starting salary—that is, the salary level associated with a B.A. degree and no previous teaching experience—is remarkably uniform throughout California. The mean value of $7043 in 1971-72 had a standard deviation of only $496, or 7 percent of the mean. The starting salary for one of the lowest spending districts in Los Angeles County, Baldwin Park, was barely 11 percent below that of wealthy Beverly Hills. These figures can be compared with the standard deviation (as a percentage of the mean) of other income classifications: female clerical and kindred workers, 17 percent; professional workers, 21 percent; average family income, 30 percent.[3] The uniformity of starting teacher salaries is partly explained by the fact that occupation (teacher) and employee qualifications (experience and education) are being held constant. Another possible reason for the uniformity is that this beginning wage rate is determined by the forces of supply and demand over a fairly broad geographic market. Major effects on the local supply price of teachers are hypothesized as the alternative wage rate and the local cost of living. The factors that might shift the demand curve are the socioeconomic level of the community and the wealth of the school district. Districts with a greater demand for educational services could offer a slightly higher than market wage and attract a larger than required supply of potential teachers. The better qualified or otherwise more highly desired teachers could then be "creamed" from the excess supply.[4]

To test these hypotheses, equations were estimated with starting salary as the dependent variable. Education, occupation, and average family income represented the socioeconomic level of the community. The average income of clerical female employees was used as a measure of the alternative wage rate in the local labor market.[5] The percentage of district population that is rural captured those cost of living effects associated with the fact that country areas are typically less expensive to live in than are urban places. (See U.S. Department of Labor, 1967.)

The variables with the greatest statistical significance and with the largest effect on starting salary are total expenditures per pupil and number of pupils (see Eq. 1, Table 5). The number of pupils is related to the demand for teachers and thus may act to shift out the demand curve and drive up the wage rate. However, neither expenditures nor district size (as measured by number of pupils) have very strong effects on starting salary—the elasticities being .1 for expenditures and .02 for district size.

The alternative wage rate has a significant effect, as shown in Eq. 2 of Table 5. However, average family income has a similar effect that is statistically more significant and stronger (Eq. 3, Table 5). A problem of interpretation arises here. Average family income can represent the taste for education, the ability to pay, or the alternative wage rate. When both family income and clerical workers' income are included in the same equation, they both retain their significance (Eq. 4, Table 5), although average family income has a larger coefficient and greater statistical significance. The addition of the occupational structure of the community leaves the two income variables relatively unchanged (Eq. 5, Table 5). Note, however, that when the income variables are excluded from the equation, the occupation variables

[3] See App. A for means and standard deviations.

[4] Other studies have suggested that the nonpecuniary rewards for teaching in high socioeconomic school districts could be traded off for monetary income. This phenomenon has not been observed here with respect to the salary structure (see below) but it does seem to have an effect on mobility, as reported in the next section.

[5] Average professional income was also investigated as a possible alternative wage rate, but this measure performed considerably worse statistically than female clerical income.

have much stronger and more significant effects (Eq. 6, Table 5). From this evidence, I would conclude that female clerical income captures the alternative wage effect and that the average family income includes the combination of socioeconomic taste effects and willingness-to-pay effects. Educational level variables (Eq. 7, Table 5) and occupation (when income is also included) have rather weak effects on starting teacher salaries.

The final variable that is evaluated is the percentage of district population living in rural areas. This variable has a negative effect on starting salary, as was expected (Eq. 8, Table 5).

A principal finding of this analysis is that although several variables have considerable statistical significance in the theoretically expected direction, none is very strong. The elasticity of starting salary with respect to total expenditures is only about .1, and it is less than .1 for the other variables. These results confirm the initial statement that starting salaries for teachers are quite uniform throughout California, subject to only small local effects.

It has been suggested elsewhere (Greenberg and McCall, 1974) that unattractive school districts must pay higher than normal salaries to attract teachers and that the reverse is true for districts that teachers find desirable. The characteristics

Table 5

EQUATIONS FOR STARTING TEACHER SALARY

Variable	Equation Number								
	1	2	3	4	5	6	7	8	9
R^2	.331	.367	.387	.397	.416	.389	.359	.403	.404
Standard error	.058	.055	.055	.055	.054	.056	.057	.055	.055
Number of observations	602	602	602	602	602	602	602	602	602
Constant	8.47	7.82	7.82	7.57	7.65	8.38	8.44	7.71	7.70
Total expenditures per pupil[a]	.104	.099	.091	.091	.091	.097	.097	.091	.092
	(10.8)	(10.7)	(9.7)	(9.8)	(9.9)	(10.4)	(10.1)	(9.9)	(9.9)
Pupils[a]	.022	.017	.017	.015	.012	.013	.018	.011	.011
	(12.7)	(8.9)	(9.1)	(7.7)	(5.4)	(6.0)	(10.1)	(4.4)	(4.4)
Average family income[a]			.078	.062	.070			.058	.057
			(7.4)	(5.4)	(3.8)			(5.0)	(4.2)
Average clerical income[a]		.084		.048	.037			.042	.043
		(5.8)		(3.1)	(2.3)			(2.7)	(2.7)
Rural								-.021	-.022
								(2.5)	(2.5)
Occupation, professional					-.036	.249			
					(.38)	(3.4)			
Occupation, managerial					-.137	.174			
					(1.1)	(1.6)			
Occupation, sales and clerks					-.036	.225			
					(.37)	(2.7)			
Occupation, crafts					.104	.293			
					(1.1)	(3.1)			
Occupation, blue collar					-.070	.120			.010
					(.82)	(1.6)			(.25)
Occupation, farmers					-.204	-.070			
					(2.5)	(.9)			
Education, high school							.127		
							(4.8)		
Education, college							.064		
							(1.8)		
Black									-.029
									(.67)

NOTE: The variables are defined in App. C; the t statistic is in parentheses.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

associated with desirability are mainly the socioeconomic parameters of the community. To test whether compensating differentials are reflected in starting salaries, selected variables were added to the equations to measure the percentage of the male population in blue-collar occupations and the percentage of the nonwhite population. Neither of these variables was at all significant (Eq. 9, Table 5). In fact, as shown by the equations, quite the reverse is true. Higher socioeconomic status communities pay somewhat higher starting salaries than lower socioeconomic communities. However, as mentioned above, measures of teacher quality other than experience and education are ignored in this study. More desirable districts may be able to hire teachers of higher quality when quality is described by subtler techniques than used here. Nevertheless, the above statistical results must be recognized. At the school district level, higher starting salaries are not observed in communities that are largely blue collar or nonwhite.

EXPERIENCE AND EDUCATION INCREMENTS, HIGHEST SALARY

Relative to starting salary, the annual salary increments for experience and educational credits showed greater variability. Whereas the standard deviation of starting salary as a percentage of the mean was only 7 percent, the same measure of variability for experience increments was 33 percent, and for educational increments it was 29 percent.[6] Highest attainable salary in the salary schedule had a standard deviation of 14 percent of the mean. The mean increments were $383 per year for each year of additional experience, and $33 per year for each educational credit (a master's degree requires approximately 36 to 45 credits). Highest salary level averaged out to somewhat less than $14,000 per year.

The variables most strongly related to these characteristics of the salary structure were the same as those discussed above for starting salary. Because of this, it was hypothesized that these characteristics might be simple functions of starting salary. This hypothesis was not borne out as the pattern of relationships varied across characteristics (see Table 6). Total expenditures per pupil affected experience increments most strongly, while average family income had the greatest effect on the salary increment for education. Highest salary was closely related to starting salary—the elasticity being more than .7. Tests of compensating differentials for experience, education, and highest salary were again completely insignificant.

In summary, the effect of total educational expenditures on the components of teacher salary schedules is rather small. For example, two districts with total expenditure levels of $800 per pupil and $1600 per pupil would pay a teacher with 10 years of experience and 45 credits $11,600 and $13,200, respectively—a difference of approximately 14 percent (other variables assumed to be at their mean values). The highest predicted salary levels in the $800 and $1600 per pupil districts are $13,375 and $15,185—a 13.5-percent difference. These figures suggest that the salary structure is not very responsive to changes in total expenditures.

[6] Throughout this section, the quadratic experience term (if present) is ignored. The results are therefore strictly correct for only the zero experience level. However, the quadratic term was quite small and would not materially alter the analysis.

Table 6

EQUATIONS FOR SALARY INCREMENTS FROM EXPERIENCE AND EDUCATIONAL CREDITS, AND HIGHEST SALARY

	Equation Number					
	1	2	3	4	5	6
Dependent Variable	Experience Increment	Experience Increment	Educational Increment	Educational Increment	Highest Salary	Highest Salary
R^2	.379	.386	.396	.405	.697	.778
Standard error	.259	.258	.226	.224	.077	.066
Number of observations	602	602	602	602	602	602
Constant	.644	-3.12	-1.63	-5.55	6.65	1.04
Total expenditures per pupil[a]	.380	.336	.182	.135	.184	.117
	(8.7)	(7.2)	(4.8)	(3.3)	(14.2)	(9.8)
Pupils[a]	.046	.041	.043	.037	.035	.027
	(4.0)	(3.5)	(4.2)	(3.6)	(10.1)	(9.0)
Average family income[a]	.281	.252	.341	.311	.162	.120
	(5.1)	(4.5)	(7.1)	(6.4)	(10.0)	(8.5)
Rural	-.109	-.098	-.110	-.100	-.056	-.041
	(2.7)	(2.4)	(3.1)	(2.8)	(4.7)	(3.9)
Average clerical income[a]	.185	.165	.150	.129	.088	.057
	(2.5)	(2.2)	(2.3)	(2.0)	(4.0)	(3.0)
Starting teacher salary[a]		.488		.509		.727
		(2.5)		(3.0)		(14.8)

NOTE: The variables are defined in App. C; the t statistic is in parentheses.

[a]The dependent variable and other variables (as noted) are in natural logarithm.

VI. THE DISTRIBUTION OF TEACHERS BY EXPERIENCE AND EDUCATION

Two issues are examined in this section: the distribution of teachers within the salary schedules; and the hiring practices of school districts with respect to experience and education as revealed by distributional patterns. Separating the issues in this way reflects two underlying decision patterns. The decision to remain with a school district after the first few years of employment is primarily a teacher decision, given the usual practice of tenured positions. Decisions on the quality mix of entering personnel are district administration decisions. These decisions, however, are related. The mobility decisions of teachers greatly influence the marginal ability of administrators to change the quality mix of the staff through new hires. And, since older or more experienced teachers are much less mobile than their younger and less experienced colleagues, the experience and age characteristics of new hires can directly influence mobility and the future distribution of teachers in the salary structure.

The analysis was performed by selecting two subsamples of school districts comprising the 12 highest spending and 12 lowest spending unified districts under the assumption that the differences observed between these subsamples would emphasize any relationships that depend on expenditures per pupil.[1] For analytical convenience, the salary schedules were condensed into 9 cells composed of three experience and three educational intervals. The experience intervals were 1 to 3 years; 4 to 7 years; and greater than 7 years. Education intervals were B.A. to 15 credits or the first two increments, whichever was greater; the next increment to 59 credits; and greater than 59 credits.

Since most school districts recognize four to six years of experience gained in other school districts, it was felt that the 1 to 3 years' experience interval would be occupied mostly by teachers new to teaching. On the other hand, teachers with 8 or more years' experience are almost never new hires and would have at least a few years of experience within the specified district. The middle group is mixed; these teachers could be either new hires with teaching experience gained elsewhere, or those who had been with the district for several years. The education intervals are intended to reflect relatively little additional education beyond the bachelor's degree, educational credits through the master's degree, and considerably more education beyond the master's.

The greatest difference between the high- and low-spending districts lies in the lower right-hand cell (Table 7). In percentage terms, almost twice as many teachers in the high-expenditure districts are in this high-experience, high-education part of the salary schedule than in the poor districts. Thus, long-term stability and the accumulation of educational credits are related strongly to total expenditures. Of course, the movement of teachers into this corner of the experience-education matrix could be conditioned by other factors as well as by total budget levels. Additional subsamples were classified according to other criteria. (See Table 8.) These criteria were based on socioeconomic characteristics of the community and pecuniary and nonpecuniary rewards. The greatest difference between extremes is observed for the total expenditures classification.

[1] Continuous, multivariate analysis was not performed here due to limitations of time and budget.

Table 7

DISTRIBUTION OF TEACHERS BY EDUCATION AND EXPERIENCE; UNIFIED DISTRICTS WITH HIGHEST AND LOWEST EXPENDITURES PER PUPIL

Years of Experience	Credits beyond B.A.			
	≤15[a]	16-59	≥60	Row Total
Twelve Highest Expenditure Districts[b]				
1-3	(.265)	(.653)	(.082)	(1.00)
	.045	.111	.014	.170
4-7	(.259)	(.449)	(.293)	(1.00)
	.053	.092	.060	.205
≥8	(.076)	(.298)	(.626)	(1.00)
	.047	.185	.393	.621
Column total	.145	.388	.463	1.00
Twelve Lowest Expenditure Districts[c]				
1-3	(.337)	(.602)	(.061)	(1.00)
	.083	.148	.015	.246
4-7	(.333)	(.471)	(.196)	(1.00)
	.104	.147	.061	.312
≥8	(.143)	(.417)	(.439)	(1.00)
	.064	.186	.192	.446
Column total	.251	.481	.272	1.00

NOTE: Figures in parentheses are row percentages.

[a]First two educational increments or 15 credits, whichever is greater.

[b]Number of observations: 7536.

[c]Number of observations: 4722.

Table 8

PERCENTAGE OF TEACHERS WITH MORE THAN 8 YEARS' EXPERIENCE AND MORE THAN 60 EDUCATIONAL CREDITS, BY VARIOUS EXTREMAL CLASSIFICATIONS

(Twelve unified school districts in each classification)

Classification Criterion	Percentage of Teachers with ≥ 8 Years' Experience and ≥ 60 Credits
Highest expenditures per pupil	.393
Lowest expenditures per pupil	.192
Highest property value per pupil	.291
Lowest property value per pupil	.168
Highest family income	.298
Lowest family income	.184
Highest teachers per pupil	.311
Lowest teachers per pupil	.241
Highest teacher salary for 10 years' experience + 45 credits	.324
Lowest teacher salary for 10 years' experience + 45 credits	.202
Highest black population	.356
Largest school districts	.314

The major problem with this analysis, however, is that it is single rather than multivariable. For example, high expenditures, high family income, high teacher salaries, high black population, and large school districts are all associated with a relatively large percentage of experienced, educated teachers. The important point to notice though is that most of these factors—except teacher-pupil ratio—are only weakly controlled by local school districts.[2]

The economic literature on mobility provides some additional evidence relating to these matters. Expenditure levels influence the distribution of teachers in at least three ways. (1) The somewhat higher starting salaries and the higher rewards to experience and education in higher spending districts would act to reduce the mobility of teachers out of these districts (Alexander). (2) Higher teacher-pupil ratios and more pleasant physical facilities in high-spending districts are nonpecuniary rewards that would be expected to reduce the probability of teachers leaving a district (Greenberg and McCall, 1973, 1974). (3) Hiring patterns of districts are related to total expenditures, with higher spending districts hiring somewhat older, better educated, and hence more stable teachers (Alexander; Greenberg and McCall, 1973, 1974). It is to this last point that we now turn.

The number of new teachers that must be hired and the mix of characteristics of the new hires are essentially separable, although both influence the distribution of teachers within the salary schedules. The number of new hires depends primarily on the number of teachers leaving a district. The interaction between personal characteristics and district or community variables that influence mobility lends a dynamic quality to teacher mobility. Thus, if a teacher decides to remain in his present job for another year because of, for example, the prospects of a somewhat higher salary than he could find elsewhere, he then becomes a year older with one more year of experience. This older and more experienced employee is even less likely to move the following year since age and experience are the most important variables influencing mobility. School administrators then are not required to hire a young, mobile replacement, and so the teacher force as a whole is more stable and moves through the salary structure toward the higher income ranges. It is therefore not surprising to find only 17 percent of all teachers in the high-spending districts in the 1 to 3 years' experience category compared with 25 percent in the low-spending districts. The percentage with 8 or more years' experience is 62 and 45 in the high- and low-expenditure districts.

Within the low-experience category (i.e., those teachers who are new to teaching), the high-spending districts have 27 percent in the lowest education class compared with 34 percent in the low-spending districts. In the medium education class, the percentages are 65 and 60 for the high- and low-spending districts. These small but statistically significant differences suggest that the richer districts tend to choose individuals with somewhat more educational background than do the poorer districts.[3] This is supported by the example of Beverly Hills which had *no* teachers with *only* a B.A. degree and one or two years' experience (see Table 4). The more educated new teachers would generally be a year or two older than those with only a B.A. and would therefore be somewhat more stable. Hiring practices are thus seen to be related to expenditure levels and to contribute to the ultimate distribution of teachers in the salary structure. In summary, it is clear that, for a variety of reasons, experience, education, and (hence) salary of teachers rise with total expenditures.

[2] A full treatment of these issues would require a study of mobility patterns—a subject that is only a peripheral issue in this report.

[3] It must be noted, however, that the poorer districts, because they must hire more new teachers than their richer colleagues, hire more teachers (in absolute numbers) with greater education, even though this larger absolute amount is a smaller percentage of all new hires.

VII. INTEGRATION AND SUMMARY OF STATISTICAL RESULTS

Total expenditures, expenditures on teachers, teacher to pupil ratios, salary schedules, and the distribution of teachers within the schedules have been investigated. However, throughout this analysis, the relative sensitivity of the components of teacher expenditures to total expenditures has only been alluded to. In this section, the findings are drawn together to develop a more integrated view of how differences in school budgets affect expenditures on teachers.

The analysis begins with the two subsamples of unified school districts with the highest and lowest total expenditures per pupil discussed in the previous section. With additional information on the structural characteristics of the salary schedules, the distribution of teachers by experience and education, teacher to pupil ratios, and other relevant information that has been compiled and averaged for these subsamples (see Table 9), it is possible to decompose the budget allocated to teacher salaries and to determine the relative sensitivity of the components to total expenditures. First consider average salary. In Sec. III, average salary (Y) was decomposed as follows:

$$Y = \Sigma(T_i/T)Y_i,$$

where T_i is the number of teachers in the i^{th} position of the salary schedule, T is the total number of teachers, and Y_i is the salary level for the i^{th} position. The ratio T_i/T (the percentage of teachers at the i^{th} position) can be obtained from Table 7. The salary levels, Y_i, can be calculated from the structural elements of the salary schedules shown in Table 9. With this information, the following types of questions

Table 9

CHARACTERISTICS OF HIGH- AND LOW-EXPENDITURE UNIFIED SCHOOL DISTRICTS, 1971-72

Characteristic	High	Low
Total current expenditures per pupil	$ 1,432	$ 652
Teacher expenditures per pupil	$ 662	$ 341
Teacher to pupil ratio	.0517	.0335
Number of pupils	12,543	13,061
Average family income	$14,125	$10,025
Average income, female clerical workers	$ 4,488	$ 4,143
Starting teacher salary	$ 7,690	$ 6,970
Highest teacher salary	$15,748	$13,708
Structure of salary schedule:[a]		
Constant	6,971	6,371
Experience coefficient	472	408
Quadratic experience coefficient	-1.9	-3.4
Education coefficient	39.1	34.8

[a]Derived from salary equations fit to each district's salary schedule; see Sec. V.

can be answered: How would average salary be affected if the high-spending districts had the low-spending districts' salary structure or distribution of teachers, or vice versa? Table 10 answers these questions.[1]

Average salary is 20 percent lower in the poorer districts than in the richer districts. If the rich districts had the poor districts' salary schedule but retained their original distributions, the average salary in the high-spending districts would be reduced by only 7 percent. However, if the high-spending districts kept their original salary schedules but possessed the distribution pattern of the poor districts, average salary would fall by 15 percent.[2] The conclusion that one can draw from these figures is that teacher distributions have more than twice the effect on average salary as salary schedules, which are of relatively minor importance.

Table 10

EFFECT ON AVERAGE TEACHER SALARY OF EXCHANGING SALARY SCHEDULES AND TEACHERS' CHARACTERISTICS BETWEEN HIGH- AND LOW-SPENDING DISTRICTS

Components of Average Teacher Salary	Average Teacher Salary ($)		Percentage Change from Actual Level	
	High-Spending Districts	Low-Spending Districts	High-Spending Districts	Low-Spending Districts
Actual level	12,808	10,198		
Effect of exchanging:				
Salary schedules	11,872	10,838	-7.3	6.3
Teachers' characteristics	10,838	11,872	-15.4	16.4

Teacher expenditures per pupil are obtained by multiplying average salary by the ratio of teachers to pupils:

$$b_t = t\Sigma(T_i/T)Y_i,$$

where b_t is expenditures per pupil devoted to teacher salaries, and t is the teacher to pupil ratio. A table can be prepared showing the relative effect of the three components of teacher expenditures per pupil (see Table 11). In Table 11, salary structure, teacher distribution by experience and education, and teacher to pupil ratio are exchanged between the high- and low-spending districts. Once again it can be seen that differences in salary structure account for rather small differences between the two types of districts. Exchanging the experience and education mix between the high- and low-spending districts results in a 15- to 17-percent change

[1] In calculating Table 10, the midpoints of the condensed distributions of Table 7 were used, as weighted by the actual distribution of teachers within the 9 cells. Specifically, in the higher education cells, teachers in the wealthier districts had 5 to 10 credits more education than did teachers in the poorer districts.

[2] Similar calculations could be made, of course, using the low-spending districts as the base. In this case, average salary in high-spending districts is 26 percent higher than in the low-spending districts; exchanging salary schedules would raise the average salary in the low-spending districts by 6 percent; and exchanging distribution patterns would result in an increase of 16 percent.

Table 11

EFFECT ON TEACHER EXPENDITURES PER PUPIL OF EXCHANGING SALARY SCHEDULES, TEACHERS' CHARACTERISTICS, AND TEACHER-PUPIL RATIOS BETWEEN HIGH- AND LOW-SPENDING DISTRICTS

Components of Teacher Expenditures per Pupil	Teacher Expenditures per Pupil ($)		Percentage Change from Actual Level	
	High-Spending Districts	Low-Spending Districts	High-Spending Districts	Low-Spending Districts
Actual level	662	341		
Effect of exchanging:				
Salary schedules	614	363	-7.3	6.5
Teachers' characteristics	560	398	-15.4	16.7
Teacher-pupil ratios	429	527	-35.2	54.5

in expenditures on teachers. But the greatest effect comes from the sharply different teacher to pupil ratios. Holding the other components constant, but just exchanging the teacher to pupil ratios, reduces the rich districts' expenditures on teachers by 35 percent and increases the expenditures of the poor districts by almost 55 percent. Of the total difference in expenditures on teachers between these subsamples of highest and lowest spending unified school districts, *teacher to pupil ratios account for two-thirds of the difference, experience and education account for approximately one-quarter of the difference, and salary structures are responsible for the remainder —or about one-tenth of the difference.*

The principal defects in the above technique of univariate analysis of the extremes of a distribution are that the relationships in the mid-range (where most of the observations lie) are obscured and that other effects are not taken into account. However, the equations estimated in earlier sections can be used here to overcome the above defects and to yield a more integrated view of teacher expenditures. Unfortunately, one component of these expenditures, the distribution of teachers by experience and education, was not analyzed by statistical equations and must be left out of the present treatment.

Equations were selected from the statistical analysis of earlier sections that were thought to best capture the main effects that had been identified.[3] From these equations, predictions can be made of the dependent variables for various levels of total expenditures—the most important variable in all of the equations. The other variables are assumed to take on their mean values.[4] These predicted values, as a function of total expenditures, are presented in Table 12. The information in the table (as derived from the equations) shows, for example, that if educational finance reforms increased the budgets of low-spending districts by 25 percent from $800 per pupil to $1000, the long-run adjustment in budget allocations to teachers would rise by 20 percent, teacher to pupil ratios would increase by 13 percent (pupils to teachers falling from 25.3 to 22.3), starting salary would show only a 2-percent rise, and

[3] The selected equations are: expenditures on teachers—Eq. 2, Table 2; teacher to pupil ratio—Eq. 9, Table 3; starting salary—Eq. 8, Table 5; experience increment—Eq. 1, Table 6; education increment—Eq. 3, Table 6; highest salary—Eq. 6, Table 6.

[4] Where appropriate, the mean of the natural logarithm of the variable is used.

Table 12

TEACHER BUDGETS, SALARIES, AND COMPONENTS THEREOF, AS RELATED TO TOTAL EXPENDITURES

Total Current Expenditures per Pupil ($)	Teacher Expenditures (% of total)	Teacher Expenditures per Pupil ($)	Teacher to Pupil Ratio	Pupil to Teacher Ratio	Starting Salary ($)	Experience Increment ($ per year)	Educational Increment ($ per credit)	Salary, 8 Years, 30 Credits ($)	Highest Salary ($)
800	51.6	413	.0395	25.3	7,025	361.5	31.4	10,498	13,407
1,000	49.5	495	.0448	22.3	7,169	393.5	32.5	10,899	13,968
1,200	47.9	572	.0496	20.2	7,289	421.7	33.6	11,249	14,444
1,400	46.6	653	.0541	18.5	7,392	447.1	34.6	11,560	14,858
1,600	45.5	728	.0583	17.2	7,482	470.4	35.4	11,837	15,227
1,800	44.6	802	.0623	16.1	7,563	491.9	36.2	12,092	15,560
2,000	43.7	875	.0660	15.1	7,636	512.0	36.9	12,327	15,864

the high end of the salary structure would rise by about 4 percent. From the marginal $200 per pupil increment in total expenditures, $82 or 41 percent would be devoted to teachers. *Less than half of the marginal budget increment thus goes to increasing teacher expenditures, and most of that amount pays for more teachers.*

All of the evidence cited in this report suggests that the fear that increased educational expenditures will be channeled directly to increased salaries is largely unfounded. The major impact would be to hire additional teachers.

VIII. INTERPRETATIONS AND CONCLUSIONS

In this section, the results developed earlier are compared with those obtained by other researchers and then some general conclusions are drawn from the research findings. Kirst's case studies of Los Angeles County school districts were designed to answer many of the same questions posed in this report concerning how budgets will be allocated when total expenditures are increased exogenously. Five districts were chosen for analysis that had received the maximum 15-percent increase in state aid provided by a major school finance reform act passed by the California Legislature in 1972 (Senate Bill 90). He concluded that, "The case study results were congruent with the statistical predictions. Most of the new money went to additional instructional personnel . . ." (p. 25). However, the districts used the increased numbers of personnel in quite different ways. One hired curriculum specialists, another restored sixth period in high school, and a third district reduced class size. Kirst also noted that despite great differences in the strength of teachers' organizations, salary increases were in the narrow range of 5 to 7 percent, which was in line with general inflationary trends during the 1973-74 school year.

In a study to evaluate the determinants of municipal employee wages, Schmenner (1973) examined the starting salary of teachers in 11 cities over a nine-year period. His principal variables were the alternative wage rate (which is similar to that used in the present study) and two unionization variables—the fraction of employees belonging to teachers' organizations and a collective bargaining dummy variable indicating whether or not formal collective bargaining takes place. Schmenner found that the elasticity of the alternative wage rate was slightly greater than unity, indicating that over time, teacher salaries move with other wage rates in the community. The effect of both of the unionization variables suggests that if a district goes from zero membership to 100-percent membership with formal bargaining, starting salaries would rise by 12 percent (p. 87). A similar study by Thornton (1971), however, yields a much smaller estimate of the effect of unions. Thornton criticized earlier studies because they did not correctly measure the strength of the union's bargaining power. He classified a district as "negotiating" if "it had in the previous year negotiated a collective salary agreement with a formally recognized teachers' organization" (p. 42). He found that in his sample of large U.S. districts, the "negotiating" variable accounted for less than a 4-percent increase in starting salary.

The relationship between firm-specific experience and income was investigated for a large 1965 sample of medium-income industrial employees (Alexander, 1974). Firm-specific experience can be identified with the annual experience increment in the context of the present study. The average annual increase over the nine-year span for which data were available was $354—quite close to the $382 average of the present study (see App. A).

Greenberg and McCall (1973, 1974) extended the use of internal labor markets to the market for teachers in their research on mobility within and between school districts. As in most mobility studies, age, income, and experience with a particular employer sharply reduced the probability of an individual leaving his job. Greenberg and McCall also found that nonpecuniary rewards influence mobility. Within a school district, teachers tend to move to those schools with higher socioeconomic-level students (Greenberg and McCall, 1973). In moves between school districts, "teachers in districts that are ranked low in terms of student characteristics are

more likely to leave their district than are teachers in the higher ranked districts. Moreover, these differences . . . would apparently not have to be very large to cause rather substantial differences in district turnover rate" (Greenberg and McCall, 1974, p. 19). Teachers are also likely to move away from small districts and toward districts having smaller classes. On the other hand, teacher mobility is rather insensitive to salary levels (pp. 20-23). Thus, the distribution of teachers by experience and education within a school district is related to many of the differences in nonpecuniary emoluments resulting from different expenditure levels as well as from differences over which school authorities have no control.

Finally, I return to the question of whether school district budgets are established as the sum of the suballocations or are essentially an exogenously determined constraint. Numerous studies have demonstrated that total expenditures are mainly related to either community wealth or community income.[1] The amount of unexplained variance is usually quite small. However, because the local budget-making process usually looms large in the eyes of local administrators, it may appear to them that there is more local control than actually exists over time and across jurisdictions. This is not unlike the process of labor negotiations where hard bargaining and strikes or strike threats appear to determine the outcomes, but where the final agreements (on average) are predictable on the basis of alternative wages and rates of inflation. The research described in this report is an attempt to illuminate by abstraction and statistical evidence the more basic underlying processes.

The major conclusions that can be drawn from the analysis are

- School budgets are, to a large degree, set exogenously. They are related to local wealth and income, and depend on state and federal contributions, which are determined by formula and regulations.
- Teacher expenditures rise at a less than proportional rate to total expenditures.
- Salary levels are related to local labor market conditions.
- Those teachers already in the system must be paid according to their experience and education—characteristics that depend on mobility patterns that are not easily controlled at the district level.
- Increased expenditures are used to increase the number of teachers. This is the principal decision over which district authorities have the most control.

At this gross level of analysis, the responses of school districts to budget changes are seen to be limited by community preferences, by supply and demand, and by the relatively uncontrollable mobility decisions of teachers. However, these limits are partly an artifact of the analysis, as the finer structure of budget allocations has not been examined. Therefore, while this present study is informative with respect to the questions posed at the beginning, it is neither the beginning nor end of understanding the relationships between budgets, teachers, and education.

[1] As examples of the literature, see McMahon, Stern, and Barro.

BIBLIOGRAPHY

Alexander, Arthur J., "Income, Experience, and the Structure of Internal Labor Markets," *The Quarterly Journal of Economics*, Vol. 56, February 1974.

Barro, Stephen M., *An Econometric Study of Public School Expenditure Variations across States, 1951-1967*, P-4934, The Rand Corporation, December 1972.

Greenberg, David H., and John J. McCall, *Analysis of the Educational Personnel System: I. Teacher Mobility in San Diego*, R-1071-HEW, The Rand Corporation, January 1973.

Greenberg, David H., and John J. McCall, *Analysis of the Educational Personnel System: VII. Teacher Mobility in Michigan*, R-1343-HEW, The Rand Corporation, February 1974.

Kirst, Michael W., "After School Finance Reform: What Will Low Wealth School Districts Do with Their Unrestricted State Aid," *Policy Analysis* (forthcoming).

McMahon, Walter W., "An Economic Analysis of Major Determinants of Expenditures on Public Education," *The Review of Economics and Statistics*, Vol. 52, August 1970.

Moynihan, Daniel P., "Equalizing Education: In Whose Benefit?" *The Public Interest*, Fall 1972.

Schmenner, Roger W., "The Determinants of Municipal Employee Wages," *The Review of Economics and Statistics*, Vol. 55, February 1973.

Simon, Larry G., "The School Finance Decisions: Collective Bargaining and Future Finance Systems," *The Yale Law Journal*, Vol. 82, No. 3, January 1973.

Stern, David, "Effects of Alternative State Aid Formulas on the Distribution of Public School Expenditures in Massachusetts," *The Review of Economics and Statistics*, Vol. 55, February 1973.

Thornton, Robert J., "The Effect of Collective Negotiations on Teachers' Salaries," *Economics and Business*, Vol. II, No. 4, Winter 1971.

United States, Department of Labor, *Three Standards of Living*, Spring 1967.

Appendix A

MEANS AND STANDARD DEVIATIONS OF VARIABLES

MEANS AND STANDARD DEVIATIONS OF VARIABLES

(Unweighted district observations, N = 595)

Variables	Mean	Standard Deviations
Elementary	.499	
High school	.148	
Unified	.353	
Pupils	7,577	33,479
Total current expenditures/pupil	836	219
Locally raised revenues/pupil	444	294
Teacher expenditures/pupil	430	105
Teacher expenditures/total expenditures	.521	.067
Teachers/pupils	.0406	.0078
Teacher salary, average	10,573	1,364
Family income	11,084	3,257
Starting salary	7,042	496
Highest salary	13,648	1,857
Professional income	12,072	2,600
Clerical income	3,962	677
Constant term	6,498	404
Experience increment/years	382	122
Educational increment/credit	32.7	9.1
Assessed property value/pupil	21,192	17,203
House value	17,602	8,341
Owner occupied	.568	.130
Residential/total property	.327	.203
Rural	.409	.400
Urban	.072	.221
Suburban	.259	.398
Families with children	.590	.086
Elderly	.147	.054
Black	.025	.057
Occupation, professional	.149	.064
Occupation, managerial	.093	.033
Occupation, sales and clerks	.245	.049
Occupation, crafts	.144	.036
Occupation, blue collar	.195	.066
Occupation, farmers	.036	.052
Occupation, service	.124	.035
Education, elementary	.119	.085
Education, high school	.589	.092
Education, college	.283	.127

Appendix B

CORRELATIONS BETWEEN VARIABLES

CORRELATIONS BETWEEN

(Unweighted district observ

Number	Variable Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Pupils														
2.	Total current expenditures/pupil	-.01													
3.	Locally raised revenues/pupil	.03	.87												
4.	Teacher expenditures/pupil	-.04	.85	.74											
5.	Teacher expenditures/total expenditures	-.08	-.37	-.31	.16										
6.	Teachers/pupils	-.14	.65	.50	.83	.24									
7.	Teacher salary, average	.14	.59	.60	.61	-.03	.07								
8.	Family income, average	.08	.22	.28	.30	.09	.01	.52							
9.	Starting salary	.14	.40	.43	.37	-.10	-.02	.69	.40						
10.	Highest salary	.16	.41	.43	.41	-.09	-.07	.85	.56	.75					
11.	Professional income	.10	.19	.26	.24	.06	-.04	.48	.87	.37	.50				
12.	Clerical income	.15	.12	.14	.14	-.00	-.16	.48	.47	.41	.55	.43			
13.	Constant term	.03	.36	.35	.33	-.08	.10	.43	.19	.76	.40	.17	.18		
14.	Experience increment/year	.09	.36	.37	-.03	-.03	-.03	.71	.41	.48	.74	.38	.40	.06	
15.	Educational increment/credit	.05	.20	.21	.24	.03	-.10	.60	.45	.46	.70	.38	.43	.11	.49
16.	Assessed property value/pupil	-.08	.70	.69	.62	-.18	.52	.33	.06	.25	.17	.07	-.03	.27	.19
17.	House value	.14	.18	.26	.25	.08	-.14	.65	.84	.51	.70	.76	.53	.24	.55
18.	Owner occupied	-.04	-.26	-.20	-.18	.15	-.24	.01	.37	-.02	.11	.34	.20	-.12	.06
19.	Residential/total property	.11	-.20	-.18	-.13	.12	-.36	.29	.49	.18	.38	.43	.35	-.05	.29
20.	Rural	-.18	-.05	-.07	-.07	.01	.28	-.54	-.39	-.44	-.62	-.34	-.48	-.17	-.45
21.	Urban	.30	-.09	-.09	-.12	.05	-.22	.11	.06	.12	.22	.04	.18	.04	.13
22.	Suburban	.08	.13	.15	-.16	.03	-.14	.50	.51	.42	.55	.42	.56	.13	.42
23.	Families with children	.01	-.24	-.27	-.25	.01	-.23	-.10	.00	.02	.05	-.03	.06	-.01	.03
24.	Elderly	-.05	.16	.21	.17	.01	.25	-.07	-.11	-.12	-.20	-.05	-.21	-.03	-.16
25.	Black	.16	.12	.02	.01	-.20	.02	-.02	-.15	.02	-.01	-.14	.04	.01	.01
26.	Occupation, professional	.08	.17	.21	.22	.05	-.05	.47	.69	.35	.49	.63	.32	.16	.39
27.	Occupation, managerial	.00	.14	.22	.20	.08	.02	.33	.63	.23	.31	.63	.20	.14	.25
28.	Occupation, sales and clerks	.18	.03	.05	.06	.02	-.27	.51	.45	.37	.55	.42	.52	.12	.44
29.	Occupation, crafts	-.06	-.10	-.12	-.15	-.05	-.09	-.13	-.40	-.05	-.10	-.38	-.01	.01	-.11
30.	Occupation, blue collar	-.05	-.11	-.18	-.16	-.04	.05	-.35	-.52	-.24	-.36	-.52	-.26	-.14	-.29
31.	Occupation, farmers	-.12	-.08	-.09	-.10	-.01	.23	-.51	-.36	-.41	-.54	-.29	-.38	-.20	-.41
32.	Occupation, service	-.06	-.05	-.07	-.08	-.05	.06	-.25	-.52	-.17	-.29	-.48	-.34	-.01	-.23
33.	Education, elementary	-.08	-.08	-.14	-.14	-.08	.14	-.46	-.52	-.32	-.48	-.40	-.41	-.13	-.38
34.	Education, high school	-.05	-.18	-.23	-.22	-.04	-.08	-.26	-.51	-.18	-.24	-.51	-.13	-.09	-.21
35.	Education, college	.09	.19	.27	.26	.09	-.04	.52	.75	.36	.52	.66	.39	.16	.43

IONS BETWEEN VARIABLES

strict observations, N = 595)

Variable Number																					
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
.06																					
.11	.49																				
.27	.19	.05																			
.24	.55	.52	.03																		
.12	.06	.16	-.20	.31																	
.05	.29	.34	-.32	.65	.49																
.17	-.45	-.47	.21	-.59	-.13	-.57															
.04	.13	.12	-.14	.14	.03	.21	-.30														
.13	.42	.46	-.07	.61	.20	.50	-.62	-.11													
.01	.03	.03	-.24	.01	.15	.08	-.18	.18	.06												
.03	-.16	-.16	.24	-.17	-.07	-.18	.31	-.20	-.22	-.89											
.01	.01	-.07	-.03	-.10	-.21	-.08	-.10	.21	-.03	.06	-.06										
.16	.39	.40	.04	.75	.27	.50	-.36	-.11	.36	-.09	-.09	-.08									
.14	.25	.24	.10	.60	.23	.37	-.17	.05	.19	-.20	.18	-.21	.58								
.12	.44	.37	-.13	.63	.13	.55	-.63	.22	.60	.04	-.20	.05	.41	.31							
.01	-.11	.05	.01	-.38	.06	-.16	.19	-.03	-.11	.07	-.01	-.11	-.51	-.42	-.24						
.14	-.29	-.22	-.07	-.58	-.12	-.38	.22	-.05	-.24	.20	-.07	.05	-.72	-.67	-.57	.42					
.20	-.41	-.46	.09	-.55	-.18	-.53	.60	-.19	-.41	.03	.09	-.03	-.43	-.33	-.50	-.12	.20				
.01	-.23	-.25	-.01	-.43	-.42	-.27	.17	-.02	-.39	-.13	.21	.23	-.37	-.20	-.27	.09	.08	-.02			
.13	-.38	-.40	.01	-.60	-.31	-.52	.36	-.09	-.38	-.23	-.03	.06	-.60	-.42	-.53	.04	.56	.58	.19		
.09	-.21	-.15	-.09	-.52	-.01	-.23	.19	-.02	-.21	.07	.02	.05	-.64	-.45	-.21	.69	.47	.01	.31	-.04	
.16	.43	.40	.06	.81	.24	.54	-.39	.08	.43	-.21	.01	-.08	.89	.63	.54	-.52	-.74	-.43	-.36	-.70	-.68

Appendix C

DEFINITION AND SOURCE OF VARIABLES

ELEMENTARY. A dichotomous variable equaling one for an elementary school district and zero otherwise.

HIGH SCHOOL. A dichotomous variable equaling one for a high school district and zero otherwise.

UNIFIED. A dichotomous variable equaling one for a unified school district and zero otherwise.

PUPILS. Average daily attendance (ADA), 1971-72 (from Department of Education, *School District Income Data*).

TOTAL CURRENT EXPENDITURES/PUPIL. Total current expense of education per ADA, 1971-72 (from *Annual Financial and Budget Report (J-41)*).

LOCALLY RAISED REVENUES/PUPIL. Revenues raised through local property taxes per ADA, 1971-72 (from *Annual Financial and Budget Report (J-41)*).

TEACHER EXPENDITURES/PUPIL. Expenditures on teacher salaries (as calculated from salary schedules per ADA, 1971-72).

TEACHER EXPENDITURES/TOTAL EXPENDITURES. Ratio of expenditures on teacher salaries to total current expense of education, 1971-72.

TEACHERS/PUPILS. Ratios of teachers (from salary schedules) to ADA, 1971-72.

TEACHER SALARY, AVERAGE. Ratio of teacher expenditures to number of teachers, 1971-72.

FAMILY INCOME. Aggregate income accruing to families divided by number of families (from 1970 Census).

STARTING SALARY. First step in teacher salary schedule, 1971-72.

HIGHEST SALARY. Highest attainable salary in teacher salary schedule, 1971-72.

PROFESSIONAL INCOME. Average earnings of males 16 years old and over in experienced civilian labor force in professional and managerial occupations (from 1970 Census).

CLERICAL INCOME. Average earnings of females 16 years old and over in experienced civilian labor force in clerical occupations (from 1970 Census).

CONSTANT. Constant term in equation to estimate teacher salary from salary schedules.

EXPERIENCE INCREMENT/YEAR. Coefficient on experience term in equation to estimate teacher salary from salary schedules.

EDUCATION INCREMENT/CREDIT. Coefficient on educational credits term in equation to estimate teacher salary from salary schedule.

ASSESSED VALUE/ADA. Ratio of equalized assessed property value (one-quarter of market value) to average daily attendance, 1970 (from Department of Education, *School District Income Data*).

HOUSE VALUE. Ratio of aggregate value of owner-occupied housing units to number of owner-occupied housing units (from 1970 Census).

OWNER-OCCUPIED. Ratio of owner-occupied housing units to all housing units (from 1970 Census).

RESIDENTIAL/TOTAL PROPERTY. Ratio of aggregate value of owner-occupied housing units to four times the equalized assessed value.

RURAL. Ratio of persons living in rural areas to all persons (from 1970 Census).

URBAN. Ratio of persons living in central city of an urbanized area to all persons (from 1970 Census).

SUBURBAN. Ratio of persons living in urban places (greater than 2500) of an urbanized area except the central city to all persons (from 1970 Census).

FAMILIES WITH CHILDREN. Ratio of families with one or more related children under 18 years old present to all families (from 1970 Census).

ELDERLY. Ratio of people greater than 60 years old to all people (from 1970 Census).

BLACK. Ratio of black people to all people (from 1970 Census).

OCCUPATION, PROFESSIONAL. Ratio of professional, technical, and kindred workers to all employed persons 16 years old and over (from 1970 Census).

OCCUPATION, MANAGERS. Ratio of managers and administrators except farm to all employed persons 16 years and over (from 1970 Census).

OCCUPATION, SALES AND CLERKS. Ratio of sales and clerical workers to all employed persons 16 years old and over (from 1970 Census).

OCCUPATION, CRAFTS. Ratio of craftsmen, foremen, and kindred workers to all employed persons 16 years old and over (from 1970 Census).

OCCUPATION, BLUE COLLAR. Ratio of operatives (except transport), transport equipment operatives, and laborers (except farm) to all employed persons 16 years old and over (from 1970 Census).

OCCUPATION, FARMERS. Ratio of farmers and farm laborers to all employed persons 16 years old and over (from 1970 Census).

OCCUPATION, SERVICE. Ratio of service workers except household to all employed persons 16 years old and over (from 1970 Census).

EDUCATION, ELEMENTARY. Ratio of males (age 20-49) and females (age 15-44) with less than high school education to all males and females in the same age groups (from 1970 Census).

EDUCATION, HIGH SCHOOL. Ratio of males (age 20-49) and females (age 15-44) with one to four years of high school education to all males and females in the same age groups (from 1970 Census).

EDUCATION, COLLEGE. Ratio of males (age 20-49) and females (age 15-44) with one or more years of college education to all males and females in the same age groups (from 1970 Census).

SALARY SCHEDULES. Taken from California Agency for Research in Education, *Teachers Salaries and Salary Schedules 1971-1972*, No. 3, April 1972, Burlingame, California.